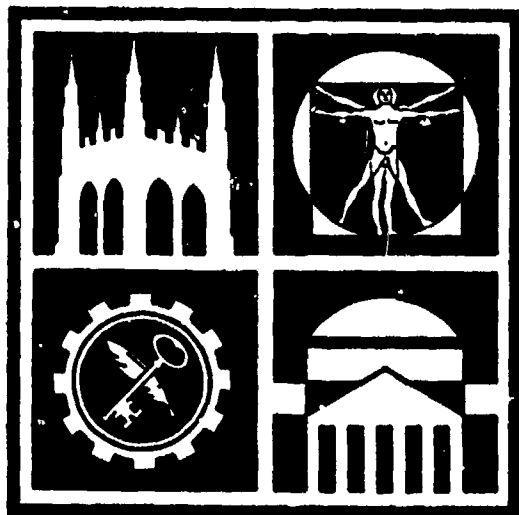


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A Technical Report
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Naval Research

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A GOAL SETTING PROCEDURE
FOR THE NAVY'S DELAYED ENTRY PROGRAM

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October, 1981

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A GOAL SETTING PROCEDURE
FOR THE NAVY'S DELAYED ENTRY PROGRAM

1.0 BACKGROUND

1.1 The Delayed Entry Program Mechanism

The Navy's Delayed Entry Program enables a recruit to delay his actual shipping date for up to a year from the time he signs a contract to enter the Navy. This is in contrast to the so-called "Direct Shipment" enlistment where the recruit actually reports for duty within a month of the contract signing. This DEP device is very popular¹, i.e. over 80% of all enlistment accessions utilize it, and is of great aid to the Navy recruiter and headquarters in that it facilitates better planning and management. It is also important to appreciate that the Navy's present lower accession goals, relative to their past accession goals, provide a valuable opportunity to build up the "pipeline stock" of recruits and to improve their long range planning capabilities. This is in marked contrast to the past where the high quotas dictated that the emphasis had to be on meeting the Navy's short term monthly shipping goals.

An interesting side benefit of building up the DEP is that it appears that a larger DEP pool, in and of itself, makes it easier to obtain more quality enlistment contracts. Previous regression studies by this Investigator (see "The Impacts of Various Types of Advertising Media, Demographics, and Recruiters on Quality Enlistments: Results from Simultaneous and Heteroscedastic Models," Richard C. Morey and John M. McCann, a Technical Report from Duke's Center for Applied Business Research, Office of Navy under Research Contract N00014-80-C-0200, July 1980) found that an increase in the DEP pool of 10% was accompanied by an increase in new High School Graduate contracts of 1.9%; in other words the elasticity of the size of the DEP pool on HSG contracts was .19. This is most likely due to the peer grapevine network operating

1. Time in the DEP counts against the six year obligation (IRR) and as longevity for pay purposes.

whereby those recruits in the DEP pool, having made their enlistment decision but not yet having shipped, encourage their colleagues to enlist also.²

The Research and Development branch of the Navy Recruiting Command is correctly attempting to improve the management of the DEP. Headquarters has set a goal for the steady-state size of the total DEP pool at 40,000. This is to be compared, for example, with the number of HSG contracts in the Delayed Entry Program as of September 30, 1979 of 10,041. They have also promulgated guidelines in the field that encourage recruiters to have 65% of their next month's quota or goal in the DEP, planning to be shipped that month. The outmonth guidelines are 45% for two months out, and 35% for the third month out. While such guidelines may be helpful, they are limited in that they do not take into account explicitly the many dynamics of the situation over time. These include: i) HSG enlistments contracts are highly seasonal with peaks in the summer, and January through March; ii) accession quotas are highly seasonal, particularly for HSG's, with the big peaks in the summer months; iii) the average months of delay, from the signing of a contract to shipment, varies according to when the contract was signed. Table 1 shows the empirical delays that resulted for a recent year. Note from Table 1 that only about 35% of the male, non prior service, HSG recruits, who sign a contract in January will direct ship whereas 53% of those signing in September will ship in the same month. Also note that 15.35% and 6.08% of those signing in January will ship within one month or two months later, respectively.

The above considerations all combine to make the size of the DEP fairly volatile, at least for HSG contracts. For example for Area 400 (containing Detroit, Washington, D.C., Pittsburgh, Indianapolis, etc), over FY 79, the DEP position for HSG, male, non prior service recruits varied as follows

2. It might be mentioned that Investigators De Vary and Shugart, in their report of July, 1979 prepared for the Air Force, suggests that the wait in the DEP has a negative impact on new contracts since if they can't ship directly they may remain unemployed until they do. However this finding is at odds with results by Morey and by D. Hansen demonstrating the positive impact of the size of the DEP on both contracts and on leads.

TABLE I : DELAY FACTORS FOR SHIPMENTS OF HSG CONTRACTS

Delay in Months	0	1	2	3	4	5	6	7	8	9	10	11	12
JAN.	.3508	.1535	.0608	.0244	.0297	.0715	.0801	.0529	.0535	.1087	.0056	.0025	.0056
FEB.	.3167	.1667	.0671	.0408	.0787	.0782	.0754	.0667	.0352	.0543	.0047	.0023	.0130
MARCH	.2901	.1424	.0844	.0964	.0903	.0872	.0858	.0525	.0259	.0373	.0048	.0014	.0014
APRIL	.2919	.1617	.1285	.1007	.1019	.0701	.0575	.0330	.0220	.0264	.0018	.0016	.0005
MAY	.3980	.2019	.1156	.0721	.0598	.0507	.0317	.0141	.0240	.0265	.0016	.0014	.0025
JUNE	.4777	.1461	.0928	.0670	.0244	.0149	.0132	.0177	.0089	.0593	.0093	.0082	.0602
JULY	.4990	.1374	.1090	.0341	.0320	.0185	.0257	.0093	.0010	.0399	.0049	.0702	.0188
AUG.	.5088	.1063	.0963	.0439	.0326	.0270	.0122	.0580	0	.0363	.0773	.0232	.0295
SEPT.	.5320	.1530	.0531	.0336	.0372	.0206	.0136	.0068	.0016	.1129	.0114	.0052	.0042
OCT.	.4952	.1158	.0535	.0526	.0182	.0133	.0069	.0105	.0499	.1555	.0206	.0105	.0058
NOV.	.4517	.0966	.0909	.0281	.0186	.0114	.0215	.0704	.0490	.1456	.0155	.0066	.0019
DEC.	.3925	.1656	.0499	.0264	.0148	.0275	.0950	.0516	.0815	.0756	.0115	.0041	.0039

*EXAMPLE 35.08 percent of contracts signed in January will ship in January and
6.08 percent of the January contracts will ship 2 months later in March.

over the twelve months (based on the Navy's Monthly DEP Analysis Reports):³

ACTUAL DEP POSITION FOR MALE,
NON-PRIOR SERVICE, HSG RECRUITS FOR AREA 400, FY 79
(at end of month)

September 1978	2,459	January 1979	2,996
October 1978	2,252	February 1979	3,204
November 1978	2,311	March 1979	3,522
December 1978	2,584	April 1979	3,751
	May 1979	3,858	
	June 1979	3,141	
	July 1979	2,678	
	August 1979	2,293	
	September 1979	1,873	

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Notice the DEP pool varied from a high of 3,858 at the end of May 1979 to a low of 1,873 at the end of September, a reduction of more than 50% over the peak. If one further computes how well the 65% - 45% - 35% guidelines functioned for the month of October 1978 (relative to the November 1978, December 1978 and January 1979 goals), the total quota for November 1978 for Area 400 was 1,229. As of the end of October 1978, the total number of recruits in the DEP, planning to ship in November, was 588 or only 48% of the goal (instead of the desired 65%). The corresponding results for 2 months and 3 months out were 35.8% (compared to the ideal of 45%) and 24.3% (compared to the ideal of 35%).

1.2 Key Thrust and Factors for Suggested DEP Targeting Approach

In order to help manage the DEP pool, the following will develop and illustrate a procedure for developing "optimal" DEP targets, by District or Area by month, by type of recruit. The "optimal" refers to cost minimization while meeting the yearly accession quotas and a terminal DEP requirement

3. An example of one of these reports is included in the Appendix. The DEP numbers used by month by Area were the HSG totals for so-called Quebecs plus the Active Mariners. Hence from the DEP report in the Appendix, the total HSG DEP for Area 400 for October, 1978 is $2,163 \cdot (.97) + 226 \cdot (.681) = 2,252.01$. For the months of January, 1979 through September, 1979, the reports show HSDG's, i.e. HSG's and GED's. These were converted to HSG's by multiplying by 1.097, the ratio of HSG contracts to HSDG contracts for FY 80.

at the end of the year. These DEP targets will take into account the following considerations:

- i) the actual or estimated initial DEP positions by Area or District at the beginning of the fiscal year;
- ii) the rate at which the initial DEP position is converted to shipments, i.e. the estimated fractions of the initial DEP position that will ship each month in the future;
- iii) the estimated attrition (i.e. fraction of recruits who enter pool but later drop out) from the initial DEP pool as well as from contracts signed throughout the year;
- iv) the desired flow of contracts during the year. This in turn is, of course, a function of the yearly accession goal, the required DEP position at the end of the year, numbers of recruits in the field, levels of advertising, and demographics. This aspect is discussed in detail subsequently.
- v) The delays that occur, for contracts signed during the year, between signing of the contract and shipment (i.e. the factors in Table 1).

To concretely illustrate these ideas, we will compute, for the HSG recruit category, the "optimal" DEP targets for Area 400, by month, for Fiscal Year 1979, and compare these to the actual HSG DEP position by month. The theoretical estimates are approximate since the Navy has only very approximate data concerning attrition and the DEP delay factors called for in (ii), (iii) and (v). However the "reasonableness" of these DEP targets will be fairly well established.

The key determinant into the setting of goals on DEP position has to be the goals on contracts. Fortunately at least one approach to this aspect is available, based on the results of an extensive model developed

over the past several years by this Investigator. This model is currently installed at Navy Headquarters to aid the Naval Recruiting Command in building its budget for the outyears. It has actually been used for the past two years and has been extensively reviewed for its rigor. The inputs to this model, known as the Duke Budget Generator Model, are discussed in several Duke Technical Reports, the latest of which is "User's Manual for Duke's Recruiting Budget Allocation/Generation Program", Richard C. Morey, September 1981. The basic model has also been published in the Management Science Journal of December 1980 under the Title of "Evaluating and Improving Resource Allocation for Navy Recruiting".

The key outputs of the Budget Generation Program are the numbers of recruiters and dollars of advertising by month by Area (or District) that will minimize the total costs of meeting given accession goals and a terminal DEP position requirement. The model can be used for quotas on either HSG recruits, or on Upper Mental Category, HSG recruits. The goals can be put into the model in the form of : 1) a yearly, national goal; ii) a set of monthly, national goals; or iii) a set of area, monthly goals. Given the above requirements and the initial sizes of the DEP pool by Area, and some other initial conditions related to the number of recruiters and levels of advertising in the field for the three months prior to the fiscal year of interest, the model also generates the "optimal" flow of contracts (either HSG or I-IIIA, HSG) by Area (or District) and by month. It is this flow of contracts that we propose to use in building the optimal DEP targets, by Area by month. However the DEP targeting approach to be discussed can accept other methods of arriving at contract goals as well.

2.1 Notation and Illustrative Inputs

The following notation will facilitate the development of the formula for the optimal DEP position, by month by Area (or District) for a given type of recruit (i.e. HSG or Upper Mental, HSG). The development given will be illustrated in terms of Area level targets for HSG recruits, but could be easily performed at the district level and/or for Upper Mental, HSG recruits.

Notation:

Let $IDEP_i$ denote the estimated size of the DEP pool (in terms of HSG recruits) at the beginning of the fiscal year of interest for Area i ($i=100, 300, 400, 500, 700, 800$). As an illustration, this number, as of September 30, 1978, for Area 400 for the category of HSG recruits was 2,459; i.e. $IDEP_{400} = 2,459$. Over all 6 Areas, the total was 10,833.

A_j denote the fraction of those recruits in the Delayed Entry Pool at the end of the j th month of the fiscal year who will drop out at some point within the next year ($j=0,1,2,\dots,12$). This is estimated, based on discussions with Headquarters, to be roughly about 4.5% for each month so that $A_j = .045$ for $j=0,1,\dots,12$. Note that $j=0$ refers to the position at the beginning of the fiscal year.

l_j denote the relative likelihoods that a recruit in the Delayed Pool at the beginning of the fiscal year will ship j months later, given that he does not drop out of the Pool ($j=1,2,\dots,12$). These percentages were empirically

developed for a recent fiscal year. They are given below:

DISTRIBUTION OVER TIME OF SHIPMENTS
FROM THE INITIAL DEP POOL

$\ell_1 = .301$	$\ell_7 = .029$
$\ell_2 = .130$	$\ell_8 = .030$
$\ell_3 = .100$	$\ell_9 = .164$
$\ell_4 = .081$	$\ell_{10} = .028$
$\ell_5 = .043$	$\ell_{11} = .02$
$\ell_6 = .072$	$\ell_{12} = .002$

To illustrate the above factors it is estimated that 30.1% of the HSG recruits in the Delayed Entry Pool as of September 30 (who will not attrit), will ship sometime during the next month, i.e. in October. Also 16.4% of those in the Pool as of September 30 shipped in the month of June, i.e. $\ell_9 = .164$. It is recognized that these numbers may vary somewhat from year to year, based on the actual composition of the Pool at the end of the fiscal year. Hence any DEP targets utilizing these factors must be interpreted as approximate guidelines.

Let a_j denote the fraction of those HSG recruits who sign a contract during the j th month of the fiscal year and then decide later to drop out ($j=1,2,\dots,12$). We recognize that this may well vary by month, e.g. the percentage of HSG recruits, who sign a contract in October and then later decide to drop out, may be quite different than those who sign in May and attrit. Discussions with the Navy have yielded that attrition percentages by month are not

currently available. Hence in the absence of any firm information, we shall illustrate the concepts by assuming that 4.5% of those signing in any given month will drop out at some point in the future, i.e. $a_j = .045$ for $j=1,2,\dots,12$.

$\beta_{j,v}$ denote the likelihood that a HSG contract, signed in the j th month of the fiscal year, will convert to a shipment v months later, given that the recruit does not attrit ($j=1,2,\dots,12$; $v=0,1,2,\dots,12$). These are the factors shown earlier in Table 1.

$C_{ij}^*(Q, TDEP, IDEP)$ denote the optimal number of HSG contracts to be signed in the j th month from the i th Area, if the national HSG Accession goal for the next year is Q , the desired total DEP position at the end of the fiscal year is $TDEP$, and the initial DEP position for Area i at the beginning of the fiscal year is $IDEP_i$. One source for such contract goals is the output from the earlier mentioned Duke Budget Allocation Program which minimizes the Recruiting Command's total costs while meeting Q and $TDEP$. It in turn is based on individual monthly, Area contract production functions estimated using data over the period 1976-1979 and shown to yield fits within 3% of the actual levels.

To illustrate these contract goals consider the actual situation for FY 79, Area 400. The Q (the actual number of HSG accessions obtained) was 55,163. The actual size of the HSG pool at the end of FY 79, i.e. as of September 30, 1979, was 10,041 (down from the 10,833 at the beginning of FY 79). The

initial size of the DEP pool for Area 400 was 2,458. Based on an exercising of the Duke Budget Allocation Model for FY 79 (for $Q = 55,163$; $TDEP = 10,041$; and $IDEP_{400} = 2,458$) and the actual initial conditions (involving the numbers of recruiters and level of advertising in the Areas for the three months prior to October 1, 1978), the optimal flow⁴ of HSG contracts for Area 400 (denoted $C^*_{400,j}$) resulting was as follows. The actual number of HSG contracts obtained is given for comparison purposes. Note that the model would have set the level of contracts to be obtained from Area 400 over the year at slightly less than that actually obtained (incidentally it would have done this by increasing the goal, and recruiters for Areas 100,300 and 700; and decreasing the goals for Areas 500 and 800).

COMPARISON OF "IDEAL" HSG CONTRACT FLOW
WITH ACTUALS FOR AREA 400, FY 79

$C^*_{400,j} (Q = 55,163; TDEP = 10,041; IDEP_{400} = 2,458)$

		Actual Contracts
October 1978	634	806
November 1978	727	792
December 1978	730	829
January 1979	1,035	1,004
February 1979	1,102	855
March 1979	1,033	844
April 1979	762	725
May 1979	703	683
June 1979	900	1,083
July 1979	889	1,014
August 1979	996	1,171
September 1979	914	1,030
TOTAL	10,426	10,836

It should also be noted at this point that if the accession quotas for a given year are given in terms of a vector \vec{Q} , i.e. either as: i) twelve monthly, national levels; ii) 72 monthly, Area levels; or iii) 516 monthly, District

4. A summary of the results of the Duke Budget Allocation run in question is included in the Appendix.

quotas (i.e. 12 x 43), then the Budget Allocation Model could accept these present quotas and produce the corresponding set of $C_{ij}^*(\vec{Q}, TDEP, IDEP_i)$.

2.2 Derivation of the DEP Targeting Formula

We recognize that at any given time the observed size of the DEP pool contains some number of recruits who will ultimately attrit. However, the targets must be on the DEP pool that can be observed in order to be meaningful, even though not all of these will ultimately convert to an accession. The formula for the "optimal" observed DEP targets for Area i at the end of month j , denoted $D_{i,j}^*(\vec{Q}, TDEP, IDEP_i)$ (denoting its functional dependence on the desired HSG quotas, the terminal national DEP position and the initial DEP position for Area i), is given by:

$$D_{i,j}^*(\vec{Q}, TDEP, IDEP_i) = \left\{ IDEP_i (1 - A_0) (1 - \sum_{k=1}^j \lambda_k) + \sum_{m=1}^j C_{i,m}^*(\vec{Q}, TDEP, IDEP_i) (1 - a_m) (1 - \sum_{v=0}^{j-m} \beta_{m,v}) \right\} / (1 - A_j)$$

$$(j = 1, 2, \dots, 12; i = 100, 300, 400, 500, 700, 800)$$

To motivate the above formula, we note that the first term is simply what remains of the initial DEP position for Area i after j months have elapsed, the $1 - A_0$ being included since the λ_j were conditioned on the recruits actually shipping. The second term for a given m is simply that fraction of contracts signed in the m th month (where $m \leq j$) which have not yet converted

to an accession, adjusted for the attriting contracts. The sum of these terms over m equal to $1, 2, \dots, j$ then represents the total number of recruits in the DEP pool at the end of month j from contracts actually signed earlier in the year. This quantity, plus the first quantity, without the $1 - A_j$, is then the attrition adjusted number of recruits in the DEP pool for Area i at the end of month j . Dividing this by $1 - A_j$ converts this to the observed size of the DEP pool.

3.0 Numerical illustration

To illustrate the formula, consider the optimal DEP target for Area 400 for October, 1978 for HSG recruits. The inputs are the actual total accession goal of FY 79 for HSG recruits of 55,163; the actual national DEP position as of September 30, 1979 of 10,041; and the actual initial HSG DEP position for AREA 400 as of September 30, 1978 of 2,548.

$$\begin{aligned} \text{Then } D_{400}^*, \text{ October, 1978 } (Q = 55,163; TDEP = 10,041; IDEP_{400} = 2,458) = \\ \left\{ IDEP_{400}(1 - A_0)(1 - \alpha_1) + C_{400}^*, \text{ October, 1978 } (Q = 55,163; TDEP = \right. \\ \left. 10,041; IDEP_{400} = 2,458) \cdot (1 - \alpha_1)(1 - \beta_{1,0}) \right\} / (1 - A_1) = \\ \left\{ 2,458(1 - .045)(1 - .301) + 634(1 - .045)(1 - .4952) \right\} / (1 - .045) = \end{aligned}$$

2,038 HSG recruits.

This utilizes the output of a Budget Allocation run for the quota of 55,163, TDEP of 10,041 and IDEP₄₀₀ of 2,548 where the optimal level of HSG contracts

resulting for Area 400, October 1978, was 634. In contrast with the optimal DEP goal for the month of October, 1978, the actual observed HSG DEP position in Area 400 at the end of October, 1978 was 2,252 (in comparison with the "ideal" of 2,038).

To further help establish the reasonableness of the procedure, we compared by month over the FY 79 the actual DEP position for Area 400, with the "optimal" targets derived using this procedure, recognizing that several of the input factors (e.g. dealing with attrition and the "spreading" of the initial DEP pool overtime) are approximate and would need to be refined if the approach were to be used.

COMPARISON OF "IDEAL" HSG DEP TARGETS
WITH ACTUAL FOR AREA 400, FY 79

$$D_{400,j}^* (Q = 55,163; TDEP = 10,041; IDEP_{400} = 2,458)$$

End of:		<u>Actual HSG DEP</u>
October 1978	2,038	2,252
November 1978	2,041	2,311
December 1978	2,137	2,585
January 1979	2,389	2,996
February 1979	2,814	3,204
March 1979	3,128	3,522
April 1979	3,274	3,751
May 1979	3,306	3,858
June 1979	2,722	3,141
July 1979	2,271	2,678
August 1979	2,217	2,293
September 1979	1,815	1,873

The "optimal" DEP targets for HSG recruits and the actual HSG DEP for Area 400 have a reasonably good fit, recognizing that the "optimal" level of contracts was 4% less than the actual. Given also the approximate nature of the several input factors, the fit is surprisingly close.

4.0 Summary

It is important to recognize that the single most important determinant in this procedure for setting DEP targets is the level of HSG contracts to be obtained by month for the Area or District in question. We have illustrated this procedure using the optimal flow of HSG contracts from the Budget Allocation Model which assumes also an optimal distribution of recruiters and advertising over the Areas. Observe that the model stated that the optimal number of HSG contracts from Area 400 for FY 79 was 10,426 whereas the actual was 10,836 or 4 % less. It may be difficult to reach these ideals if the required recruiters and advertising funds are not available or for some reason are not or cannot be allocated to the areas suggested. Constraints on the available budget can be fed into the Duke Allocation Model as well to best minimize any shortfalls within the available budget. The contract flow from this version could then be an input into the DEP targeting approach. As an alternative, the Navy could utilize existing mechanisms, if they prefer, for setting contract goals by month by Area, and then use these as an input to the DEP target procedure. It is felt that concrete DEP targets, at least for the quality recruit categories that vary over the year, will aid Headquarters in isolating problems at any early stage and facilitate a constructive dialogue with the Area or District managers.

APPENDIX

The Appendix includes two items:

- 1) An example of a DEP report from the Navy Recruiting Command for October, 1978 Area 400. The four numbers in brackets are the ones used to compute the HSG DEP.
- 2) The details of the Duke Budget Generation Run for FY 79 which utilizes the year's actual demographics, the actual level of national HSG accessions obtained in the year as the quota, the actual terminal HSG DEP position of 10,041, and the actual initial HSG DEP positions for each Area. The accompanying Table shows the comparison with the actual situation, the result being that the accession and terminal DEP levels actually reached might have been obtainable with about 5.9% less recruiters and 9.6% less advertising expenditures, if it had been possible to reallocate the goals, recruiters and advertising expenditures to minimize the total costs.

AREA FOUR

DESCRIPTION	31 OCTOBER 1978												TOT
	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	
QUEBEC GOAL	939	771	998	756	669	612	767	1021	1021	1021	1021	1021	1021
TOTAL IN DEP	47.9	284	266	121	10.2	46	35	21.2	21.2	21.2	21.2	21.2	21.2
PERCENT OF GOAL													
NUCLEAR FIELD	22	11	18	5	1	2	3	153	153	153	153	153	153
ADV ELECT FIELD	79	65	36	31	20	14	8	418	418	418	418	418	418
ADV TECH FIELD	16	6	7	1	3	1	2	49	49	49	49	49	49
MED TECH	8	0	0	0	0	0	0	0	0	0	0	0	0
SCH GUAR PROG	236	168	188	75	42	27	41	1312	1312	1312	1312	1312	1312
OCC SPEC PROG	55	8	7	1	1	0	0	104	104	104	104	104	104
DREP	8	0	0	0	0	0	0	0	0	0	0	0	0
PSI	2	0	0	0	0	0	0	0	0	0	0	0	0
SUEFRER	64	24	10	8	1	1	0	119	119	119	119	119	119
SEMINAR-RIRNEN													
TOTAL Q A	396	263	251	114	66	45	55	2037	2037	2037	2037	2037	2037
TOTAL Q B	48	12	7	5	1	1	0	52	52	52	52	52	52
TOTAL Q C	35	12	7	5	1	1	0	52	52	52	52	52	52
TOTAL Q D	32	12	7	5	1	1	0	52	52	52	52	52	52
PERCENT SE	92.6	95.4	97.4	95.9	98.2	97.8	100.0	95.4	95.4	95.4	95.4	95.4	95.4
PERCENT NSG	96.9	96.8	97.8	98.3	98.5	100.0	100.0	97.8	97.8	97.8	97.8	97.8	97.8
BLACK Q A	54	23	27	19	8	1	6	202	202	202	202	202	202
BLACK Q B	11	3	3	0	1	0	0	15	15	15	15	15	15
BLACK Q C	14	3	3	0	0	0	0	28	28	28	28	28	28
BLACK Q D	15	10	11	16	11	2	18	110	110	110	110	110	110
PERCENT OF Q	15.7	10.2	11.3	16.5	11.8	2.2	18.9	11.0	11.0	11.0	11.0	11.0	11.0
PERCENT SE	82.3	89.7	90.0	100.0	100.0	100.0	100.0	91.6	91.6	91.6	91.6	91.6	91.6
PERCENT NSG	85.1	89.7	100.0	95.0	100.0	100.0	100.0	93.7	93.7	93.7	93.7	93.7	93.7
OTHER RACES A	7	12	5	0	1	1	0	52	52	52	52	52	52
OTHER RACES B	1	0	0	0	0	0	0	0	0	0	0	0	0
OTHER RACES C	0	0	0	0	0	0	0	0	0	0	0	0	0
OTHER RACES D	0	0	0	0	0	0	0	0	0	0	0	0	0
PERCENT OF Q	1.7	4.2	2.6	0.8	2.3	2.2	0.8	2.6	2.6	2.6	2.6	2.6	2.6
PERCENT SE	100.0	100.0	100.0	100.0	100.0	100.0	100.0	93.8	93.8	93.8	93.8	93.8	93.8
PERCENT NSG	87.5	100.0	100.0	100.0	100.0	100.0	100.0	98.2	98.2	98.2	98.2	98.2	98.2
9-M-TEP GOAL	240	118	247	248	249	249	249	249	249	249	249	249	249
TOTAL IN DEP	114	34	34	34	34	34	34	34	34	34	34	34	34
PERCENT OF GOAL	47.5	28.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
PERCENT SE	50.4	82.4	51.2	67.5	67.5	67.5	67.5	67.5	67.5	67.5	67.5	67.5	67.5
PERCENT NSG	52.3	41.2	76.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PENDING GOAL	22	9	21	25	33	22	21	219	219	219	219	219	219
TOTAL IN DEP	9	4	6	5	2	2	2	30	30	30	30	30	30
PERCENT OF GOAL	40.9	44.4	28.6	22.7	6.1	9.1	9.5	14.3	14.3	14.3	14.3	14.3	14.3
USN FEMALE GOAL	124	126	140	125	141	124	141	1296	1296	1296	1296	1296	1296
TOTAL IN DEP	116	109	83	35	23	13	9	408	408	408	408	408	408
PERCENT OF GOAL	93.5	79.4	59.3	28.0	16.3	10.5	6.4	30.9	30.9	30.9	30.9	30.9	30.9
62 GOAL	111	111	111	111	111	111	111	111	111	111	111	111	111
TOTAL IN DEP	4	4	4	4	4	4	4	4	4	4	4	4	4
PERCENT OF GOAL	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
USN FEMALE GOAL	114	114	114	114	114	114	114	114	114	114	114	114	114
TOTAL IN DEP	4	4	4	4	4	4	4	4	4	4	4	4	4
PERCENT OF GOAL	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

ENLISTED MINORITY NPS ACCESSIONS (ACDU) BY RENTAL GROUP

	MG I		MG II		MG III		MG IV		NSG		SCH ELIG		TOTAL	
RACE														
CAUCASIAN	85	7.2	405	34.4	461	39.2	204	17.3	939	79.8	1055	89.7	1176	81.6
BLACK	0	0.0	35	15.8	99	44.6	80	36.0	192	86.5	185	83.3	222	15.4
OTHER RACE	2	4.5	11	25.0	21	47.7	10	22.7	32	72.7	40	90.9	44	3.1
TOTAL BY RACE	87	6.0	451	31.3	581	40.3	294	20.4	1163	80.7	1280	88.8	1442	100.0
ETHNIC														
SPANISH	0	0.0	7	30.4	11	47.8	5	21.7	20	87.0	21	91.3	23	1.6
NATIVE AMERICAN	0	0.0	1	33.3	1	33.3	1	33.3	2	66.7	2	66.7	3	0.2
ASIAN	2	11.1	3	16.7	9	50.0	4	22.2	10	55.6	17	94.4	18	1.2
OTHER ETHNIC	85	6.1	440	31.5	560	40.1	284	20.3	1131	80.9	1240	88.7	1398	96.9
TOTAL BY ETHNIC	87	6.0	451	31.3	581	40.3	294	20.4	1163	80.7	1280	88.8	1442	100.0

TOTAL FISCAL YEAR 1979

	MG I		MG II		MG III		MG IV		NSG		SCH ELIG		TOTAL	
RACE														
CAUCASIAN	85	7.2	405	34.4	461	39.2	204	17.3	939	79.8	1055	89.7	1176	81.6
BLACK	0	0.0	35	15.8	99	44.6	80	36.0	192	86.5	185	83.3	222	15.4
OTHER RACE	2	4.5	11	25.0	21	47.7	10	22.7	32	72.7	40	90.9	44	3.1
TOTAL BY RACE	87	6.0	451	31.3	581	40.3	294	20.4	1163	80.7	1280	88.8	1442	100.0
ETHNIC														
SPANISH	0	0.0	7	30.4	11	47.8	5	21.7	20	87.0	21	91.3	23	1.6
NATIVE AMERICAN	0	0.0	1	33.3	1	33.3	1	33.3	2	66.7	2	66.7	3	0.2
ASIAN	2	11.1	3	16.7	9	50.0	4	22.2	10	55.6	17	94.4	18	1.2
OTHER ETHNIC	85	6.1	440	31.5	560	40.1	284	20.3	1131	80.9	1240	88.7	1398	96.9
TOTAL BY ETHNIC	87	6.0	451	31.3	581	40.3	294	20.4	1163	80.7	1280	88.8	1442	100.0

REPORT

NAVY RECRUITING COMMAND
RECRUITING/ADVERTISING EXPENDITURE OPTIMIZATION

	TOTAL FOR HCR17CN	PERIOD 1	PERIOD 2	PERIOD 3	PERIOD 4	PERIOD 5	PERIOD 6	PERIOD 7	PERIOD 8	PERIOD 9
ENLISTMENTS FOR REGION 1	14,5887	0.9167	1.0410	1.0435	1.4346	1.5210	1.4466	1.0492	0.9809	1.2587
ENLISTMENTS FOR REGION 2	14,6676	0.9015	1.0250	1.2407	1.4750	1.5250	1.4392	1.0598	0.9977	1.2771
ENLISTMENTS FOR REGION 3	10,4256	0.6336	0.7267	0.7303	1.0351	1.1023	1.0330	0.7623	0.7029	0.9003
ENLISTMENTS FOR REGION 4	3,2476	0.2172	0.2301	0.2351	0.3168	0.3367	0.3195	0.2338	0.2162	0.2757
ENLISTMENTS FOR REGION 5	8,0880	0.4797	0.5623	0.5622	0.7838	0.8182	0.7726	0.5761	0.5425	0.6560
ENLISTMENTS FOR REGION 6	5,9540	0.3962	0.4427	0.4439	0.5869	0.6188	0.5917	0.4236	0.3568	0.5025
TOTAL (1000'S)	56,5716	3.5450	4.0368	4.0598	5.6322	5.9220	5.5526	4.1099	3.8369	4.9144
ACCESSIONS FOR REGION 1	13,341	0.9896	0.7904	0.7199	0.9319	0.8443	0.9166	0.7060	0.8650	1.7498
ACCESSIONS FOR REGION 2	13,634	1.0540	0.8129	0.7397	0.9630	0.6602	0.9341	0.7165	0.8808	1.8023
ACCESSIONS FOR REGION 3	10,546	1.0049	0.6888	0.6079	0.7472	0.6518	0.7303	0.5382	0.4507	1.4178
ACCESSIONS FOR REGION 4	3,765	0.4648	0.2632	0.2430	0.2729	0.2214	0.2605	0.1794	0.2158	0.5201
ACCESSIONS FOR REGION 5	7,403	0.5497	0.4357	0.3949	0.5113	0.4595	0.4575	0.3843	0.4152	0.9674
ACCESSIONS FOR REGION 6	6,470	0.7187	0.4637	0.4031	0.4684	0.3896	0.4449	0.3173	0.3829	0.8769
TOTAL (1000'S)	55,163	4.7816	3.4748	3.1077	3.8946	3.4268	3.7840	2.8418	3.4705	7.3343

REPORT (continued)

PERIOD 10	PERIOD 11	PERIOD 12
1.2423	1.3804	1.2737
1.2218	1.3866	1.2775
0.8890	0.9959	0.9141
0.2712	0.3011	0.2721
0.6011	0.9097	0.7038
0.4949	0.5527	0.5081
-----	-----	-----
4.8403	5.5264	4.9552
1.6032	1.6906	1.5252
1.6250	1.7118	1.5338
1.1745	1.2377	1.0959
0.3781	0.3910	0.3377
0.9757	1.0027	0.3512
0.6795	0.7090	0.6165
-----	-----	-----
4.2268	6.7508	5.9603

Enlistments

Accessions

APPENDIX

Male High School Senior Population and General Unemployment Rate for FY79

	Area 100	Area 300	Area 400	Area 500	Area 700	Area 800
No. of male High School Seniors for FY79	332,635	235,593	323,173	284,639	190,720	251,069
Monthly Unemployment rate						
Oct. 78	6.48%	5.56	4.90	4.01	4.45	5.54
Nov. 78	6.25	5.14	5.31	4.13	4.96	5.82
Dec. 78	6.06	5.28	5.42	4.50	4.88	5.97
Jan. 79	7.16	6.34	6.72	4.85	4.99	7.00
Feb. 79	7.09	5.75	6.78	4.71	4.50	6.86
March 79	7.08	5.50	6.22	4.64	4.30	6.42
April 79	6.03	5.11	5.85	4.16	4.29	5.98
May 79	5.81	5.12	5.22	3.77	4.29	5.46
June 79	6.61	5.74	5.88	4.49	4.88	5.80
July 79	6.83	5.95	6.08	4.21	4.78	5.80
Aug. 79	6.58	5.39	6.13	4.03	4.64	5.85
Sept. 79	6.62	5.39	6.01	4.08	4.59	5.79

APPENDIX

TABLE 2: Other Demographics for

FY79

	Area 100	300	400	500	700	800
Propensity to Enlist	.224	.272	.2195	.1866	.2279	.2068
Labor Force Size October, 1978)	18,577,000	11,652,000	18,096,000	12,954,000	9,503,000	16,003,000
Ratio of Military pay to Civilian pay October, 1978)	.781	.930	.666	.687	.82	.724
Percent of male 17-21 year olds that are Black	11.14%	25.92%	13.84%	8.14%	15.4%	6.66%
Percent of male 17-21 year olds in SMSA	85.87%	58.63%	73.29%	61.46%	69.26%	81.81%

TABLE A- : Comparisons, by Area for FY79, of Resources and HSG Contracts Between Actuals and Theoretically Optimal Levels

	Actual # of HSG Contracts	Optimal # of HSG Contracts	Actual # of Recruiter Man-Years	Optimal # of Recruiter Man-Years	Actual Level of Dollar Advertising	Optimal Level of Advertising
Area 100	12,127	14,589 (20.3% more)	659	817.2 (24% more)	\$1,456	\$1,870 (28.4% more)
Area 300	10,869	14,668 (34.9% more)	586.8	824 (40.4% more)	\$1,060K	\$1,860K (75.5% more)
Area 400	10,836	10,426 (3.9% less)	645.8	587.3 (9.1% less)	\$1,484K	\$1,310K (11.7% less)
Area 500	6,363	3,248 (48.9% less)	487	179.6 (63.1% less)	\$1,125K	\$ 436K (61.2% less)
Area 700	6,995	8,088 (15.6% more)	426.3	466.7 (9.5% more)	\$ 860K	\$ 934K (8.6% more)
Area 800	9,844	5,954 (39.5% less)	600.2	328.4 (45.3% less)	\$1,129	\$ 806K (28.6% less)
Country as Whole	57,034	56,973	3,405	3,203 (5.9% less)	\$7,114K	\$6,430K (9.6% less)

Hence we notice that the major differences are:

- i) Area 100 and Area 300 appear to warrant substantially more resources and would then produce substantial increases in quality enlistments.
- ii) Area 400 is about on target as is Area 700.
- iii) Areas 500 (Chicago) and 800 (Far West) both appear to be substantially overstaffed and, while it is true that the reduction of resources in those Areas will lower production in those Areas, the gains from putting those resources in other Areas more than offsets the losses.

The difference in allocations are due in part to the size of the DEP pool at the beginning of the year, but more to economic efficiencies where resources are allocated to those Areas with the highest yield per dollar spent. Because of unfavorable demographics associated with "propensity to enlist" (Areas 500 and 800 have the lowest of the 6 Areas), ratio of military pay to civilian pay (Areas 500 and 800 are among the lowest for this measure, i.e., .687 and .724 compared to .93 for Area 300, for example), and percent of 17-21 year old males who live in an urban area (i.e., Area 500 is only 61.5% compared to 85.9% for Area 100), Areas 500 and 800 have intrinsically a lower yield, in terms of HSG contracts per dollar expended than some of the other areas and appear not to merit the magnitude of resources that has been typically allocated to them in the past.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Navy's Recruiting Program allows a quality recruit to delay his actual shipping date for up to a year from the time he signs a contract to enter the Navy. This research provides a way to better manage the size of the Delayed Entry Program by providing dynamic targets for recruits by area by month. The approach involves the initial conditions, the size of the Pool desired by the country at the end of the year, the total accessions quotas, demographics, and the delays that occur between signing and shipping. Actual results are compared to the theoretical targets for FY79.		